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TRAINING GUIDE

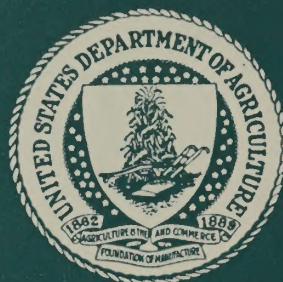
GRAZING MANAGEMENT

Planning and Followup

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This Guide should be used as a reference textbook. Its main purpose is to describe the total grazing management job. Main task and job element is set forth with respect to the whole and in the entire job in a sequence that leads to effective on-the-ground management of livestock use.

How existing instructions have been altered, some old ones brought forward, and some new material added. Each change was made to (1) fill in instructional gaps, (2) improve existing material, and (3) update our approach to include better management techniques.

We hope that this kind of guidance will help to surmount a management philosophy of step-by-step progress toward understood goals. Our best on-the-ground efforts can be made only by using professional knowledge and sound judgment, and in the framework of administrative policies, rules, and regulations.

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TRAINING GUIDE

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GRAZING MANAGEMENT

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Planning and Followup

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USDA - FOREST SERVICE
Region Four
Division of Range Management
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(Intermountain Region)

FOREWORD

This Guide should be used as a reference textbook. Its basic purpose is to describe the total grazing management job. Each task and job element is set forth with respect to the others and to the entire job in a sequence that leads to effective on-the-ground management of livestock use.

Some existing instructions have been altered, some old material brought forward, and some new material added. Such changes are intended to (1) fill in instructional gaps, (2) overcome existing conflict, and (3) update our approach to include new or unused knowledge.

We hope that this kind of guidance will help to recreate a management philosophy of step-by-step progress toward understood goals. Our best on-the-ground effort can be had only by using professional knowledge and sound judgement, set within the framework of administrative policies, rules, and regulations.

If this Guide encourages you to think--if it helps you to connect the many steps of your work into a whole--if it aids you in doing a better job of professional grazing management on the ground--then it will have served its purpose.

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GRAZING MANAGEMENT

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TRAINING GUIDE

GRAZING MANAGEMENT (Planning and Followup)

CHAPTER 1

INTRODUCTION1.1 SCOPE OF THE GRAZING MANAGEMENT JOB

The job of achieving desired on-the-ground management of rangelands and of meeting associated Forest Service responsibilities can best be shown as a chronological process which leads to the desired results. In actual practice, however, the current status of individual allotments may lie at almost any point along this path. Consequently, the chronology is difficult to follow in actual doing. It finds its greatest usefulness as a thought process. It is presented here in that context.

1.11 Collection of Facts and Information

The quality of any designed course of action rests heavily upon the completeness and accuracy of factual information available for analysis. This is certainly true of range allotment management planning. Any item of factual information that has a bearing on the solution should be made available if at all practical to do so. By the same token, gathering of factual items that are not relevant to the particular planning process is a waste of valuable time. This step includes the compilation and summarization needed to put the factual material into a readily usable form.

1.12 Management Goals

Before one can develop a program of management, it is necessary to decide what such a program is intended to accomplish. The nature of this accomplishment is directed by legislative mandate.

1. Correct unsatisfactory resource conditions so that maintenance of site productivity (sustained yield) is achieved.
2. Produce those goods and services from the land that, in combination, provide the greatest benefit to the people (multiple use).

Within these general guidelines, specific goals must be chosen as targets for accomplishment. These provide the sense of direction that the management program must follow.

1.13 Analysis of Facts

Thorough and professional analysis of factual material is vital in assuring quality of a management program. Many of the weaknesses in applied management have their origin in faulty or incomplete analysis of available facts.

The step is basically a thinking process. It must consider all sorts of causes, effects, and relationships in terms of the desired goals. It must not be short cut. Nor does it lend itself to any standard procedure or fixed format. The end product is a group of possible or alternative solutions of varying value. Often, the alternatives will relate to only a part of the total program.

1.14 Design of Management Prescription

By a process of elimination, the alternative solutions must be reduced to a single approach best suited for the individual allotment. The choice is made by considering results and interrelationships, and progressively rejecting the less effective and less desirable solutions. During this stage, it is most important that both resource problems and output targets be clearly in mind. The management prescription will include both proposed development and land treatment work and the proposed method and schedule for manipulating the livestock. It will be selected within the framework of all externally imposed constraints.

Any prescription is probably something less than perfect. Rarely will it fit precisely on the ground without change. Many desirable modifications will not be recognized until the program is tested on the ground. Enough thought must be given to come up with a management and development format which requires a minimum of later modification. Time spent in thought, negotiation, and planning is much more efficient than is time spent in correction later on.

1.15 Writing the Allotment Management Plan

The management prescription must be set down in writing. This documentation of proposed action is the management plan. Plans are prepared to serve as working tools for the land manager and for his successors. Each plan must be tailor made as to content but should contain the following general kinds of information:

1. Summarization of facts and information.
2. Statement of management goals.
3. Pertinent analysis of facts and information.
4. Thorough description of the management prescription.
5. An outline of implementation action.

6. Specific and clearcut statement of examination and followup needed to insure the intended application.
7. Method of evaluating effectiveness of results.
8. A procedure for revising, modifying, and improving the program.
9. Alternative programs and/or implementing procedures to use if needed.
10. Interim management programs as needed.

1.16 Program Implementation

A management plan is not an end in itself. The final product will be the action program on the ground. Implementation is doing those things called for in the plan including a schedule or timetable for their accomplishment. It includes all elements of both the development plan and the management system. Implementing documents include form 1300-4, cooperative agreements, annual permittee plans of use, forms 1300-3 and 8, etc.

It is very important that actions on the ground be done as designed and intended. This requires an adequate job of project supervision and inspection and sufficient allotment examination to insure compliance with the annual plan of use. This does not mean that changes should not be made during the doing phase. It does mean that any changes which are made must be by intent and not by accident or default.

1.17 Evaluation Followup

Many features of the original prescription must, of necessity, be based on professional judgment, inference, and prediction. Even a well designed prescription will usually have room for some improvement. Often, desirable changes may not become apparent until put to the test. Almost every management program can be improved upon. Evaluation followup is the source of data for this improvement. It yields the information needed to identify desirable modifications. It is also the basis for checking program effectiveness in terms of intended accomplishment. Usually, the period of smoothing out the program can be expected to last from three to five years or through one rotation cycle.

Neither the grazing capacity nor the management should ever be considered as static and final. Continual evaluation and revision is needed to keep up to date, and flexibility must be a basic characteristic of any management program.

The ultimate test of effectiveness of the management program is in the trends of soil and vegetation. Long-term trends will show either the need for additional program modification or the successful achievement of desired management direction.

1.2 MANAGEMENT MODELS

1.21 Basic Requirements

Region 4 policy is to establish on each range allotment a management system that meets the following basic requirements:

1. It must be tailored to the inherent characteristics and the condition of the particular area involved.
2. It must meet plant growth and soil stabilization requirements on all parts of the allotment.
3. It must be fully coordinated with the needs of other uses and activities.
4. The system should be designed to best meet the needs of foraging livestock after requirements 1, 2, and 3 are fully met.

All allotments on which the foregoing basic requirements are being met will be considered as being under intensive management.

1.22 General Discussion

Current management system designs in Region 4 are developed under one of two principal management models. One is the proper-use model as expressed in the key area-key species approach to management. This model has been widely used in Region 4 in the past, particularly on cattle ranges. The other management model is the planned-rest model.

Because the basic requirements can almost always be better met under the planned-rest model it will be regional policy to implement management systems based upon it wherever practicable. Since this Guide is intended to help with current and future management planning efforts, it relates throughout to the planned-rest model.

The grazing system itself is merely a means of applying the desired management model to a specific area of land. It may assume an almost unlimited variety of forms under either approach. Because of this it is important to clearly understand the distinction between the two models. The following descriptions illustrate these differences.

A COMPARISON OF SOME CHARACTERISTICS OF TWO MANAGEMENT CONCEPTS

1.22

1.22

Characteristic	Proper-Use Management Model	Planned-Rest Management Model
Basic Principles	Limits herbage removal of selected key plants to a predetermined level which allows these plants, and all others, to perform their physiological processes.	Provides for the physiological needs of individual plants by providing planned periods of rest which allow the plants to recover from adverse effects of grazing.
Proper Plant Utilization	Available research information indicates a maximum of 40-50% utilization for most sites in good to excellent condition. Utilization levels must be reduced on sites in poorer condition.	Utilization of plants is not a criteria of allowable use. Assumes that preferred species on preferred sites will be heavily utilized even under light stocking and that other means must be used to provide for the needs of individual plants.
Selective Grazing	Fails to compensate for natural habits and preferences (selective grazing) of the livestock.	Is designed specifically to counteract natural habits and preferences (selective grazing) of the livestock.
Bench Marks	Bench marks serve as the key to both use impacts and trends.	Bench marks are used only as permanent trend study sites.
Performing Evaluation Followup	Measure and record grazing impacts on key areas. Summarize these in relation to proper use criteria and calculate dates and animal months of proper use for the area.	Evaluate grazing impacts for the unit as a whole and use this information to modify, improve, and firm up the operation of the management program. Base the allowable use on other factors.
Determining Allowable Use	Criteria are developed which set maximum levels of impact to be allowed. Usually this is a percent utilization of key species on key areas but may be soil disturbance or other impacts.	Maximum allowable use is determined by factors such as response of livestock, on-site effects of forced distribution, and coordination requirements. Plant utilization is not a direct factor.
Key Element of Model	Proper use criteria.	Planned rest from use.

1.23 Proper-Use Management Model

The proper-use management model is based on the knowledge that most plants can withstand removal of a portion of their current growth each year and still make full and normal growth the following year. The amount or portion of the plant that can be safely removed each year is called the "proper-use" amount.

This model is the basis of the key area-key species approach to management. Its fallacy lies in the fact that the degree of use on individual plants cannot be regulated. Livestock graze the range selectively, by areas, species, and individual plants. They consistently graze the more palatable plants and more accessible or preferred areas closely and invariably beyond proper-use level. Plants grazed heavily one year tend to receive heavy use the next. There is no practical point on the stocking scale where close grazing of some part of the vegetation does not occur. Stocking rate simply determines the size of the heavily used area and the rate of vegetation change due to grazing. So regardless of the stocking level, the more palatable and accessible plants are gradually eliminated. The process then shifts to less palatable plants and leads progressively to ever-enlarging areas of deterioration.

1.24 Planned-Rest Management Model

The planned-rest management model is based on the premise that severe cropping of some plants is inevitable under use, that such cropping weakens the plant, and that opportunity must be given the plant to recover from this adverse impact if site conditions are to be maintained or enhanced.

The model accepts the knowledge that most plants annually store a surplus of food reserves, thus allowing them to survive severe defoliation in any given year even though they may be weakened by such impact. The model anticipates complete defoliation because, under use, some plants are usually grazed to this degree.

Because of the natural selective grazing habits of livestock, the amount of use on individual plants cannot be controlled in any practical manner. The planned-rest management model compensates for this problem by providing rest periods at such times and of such durations that will allow individual plants to fully recover from the adverse effects of cropping. It further recognizes that such rest periods must be planned so as to specifically enhance basic physiological requirements of the individual plant, namely vigor, soil nutrient supplies, and reproduction. The key to the planned-rest model lies in positive control of rest from use rather than in attempting to regulate use itself.

CHAPTER 2

GATHERING FACTS AND INFORMATION

The quality of management planning depends on the quality, amount, and relevancy of the basic information. There is no point in assembling irrelevant information, but there is generally more pertinent data available than has commonly been gathered and used. There is a need to sift information more carefully and to strive for a balance between adequacy and usefulness.

2.1 SOURCES OF INFORMATION2.11 Range Analysis

Range analysis provides most of the facts needed for vegetation and soil, some of the facts for livestock, and a few other miscellaneous facts. The balance of the information is obtained from other sources.

2.12 Other Sources

The following list shows several other sources of information but is not a complete listing. It should be added to as other sources come to mind.

1. Big game range analysis.
2. Actual use and proper use records.
3. Miscellaneous user activity reports.
4. Range examination notes.
5. Old management plans and annual plans of use.
6. Forage use checks.
7. Range readiness records.
8. Observations and experience.
9. Permittee and herder contacts.
10. Research findings.
11. Hydrologic analysis (if available).
12. Soil studies and surveys (if available).
13. Long-term trend studies.

2.2 KINDS OF INFORMATION

This section lists a wide range of informational items useful for management planning purposes. The list is not complete. Likewise, some of the items listed may not be pertinent to the particular planning effort. The list can serve as a starting point and should stimulate ideas on other kinds of information that may be useful. It should prove helpful in seeking out information that can be useful in reaching the best possible solution.

2.21 Vegetation

What cover types, plant communities and species are present and in what quantities and where?

Are the species native or exotic? Natural or planted?

What is the desirability rating, palatability, nutritive and soil-binding properties of the various species?

What is the present vigor or health of the various species present?

What is the condition and trend of each plant community?

What is the volume of production of the various species, and the annual variation in total yield from year to year?

Is reproduction satisfactory?

Is litter being produced? Accumulated?

What are the phenologic characteristics and physiological needs of the various species?

What poisonous plants and noxious weeds occur? How much and where?

2.22 Soil

What is the distribution of soils and parent materials.

What is the nature of the erosion; its extent, severity, kind and location?

What is the present trend in soil stability?

What is the productivity potential of the various soils?

What are the inherent erosion hazards and erodibility indices?

What are the hydrologic types and geomorphic classifications?

2.23 Livestock

What are the numbers, kind and class of livestock and current period of use?

What are their preferences as to forage species and areas, their distribution patterns and usual utilization by species and in total?

Where do the livestock enter the allotment and what physical movements are made in their distribution?

What are the daily and seasonal weight gains?

What are the normal death losses and from what cause?

What is the present situation regarding predators and their relationship to livestock losses and management?

What is the historic livestock use?

2.24 Coordination

What other resource activities and land uses are presently occurring on the allotment?

Actual uses - where are they located and how much area do they occupy or influence?

What are the impacts of these other uses; removal of vegetation, soil disturbance, interference of one use with another?

What is the potential development of other resources in the foreseeable future?

What is the community involvement in other resource uses?

What decisions that have a bearing on development and management of the range have already been described in the Regional Multiple Use Management Guide and the Ranger District Multiple Use Plan?

2.25 Rancher

How many permittees on the allotment and the size of each permit?

How does the National Forest permit fit into each of their respective operations?

What is their normal contribution to the National Forest operation through improvement maintenance, herding, salting, etc., and how is it accomplished?

Do permittee's actively participate in on-the-ground management?

What is the permittee's attitude toward progressive range management and change?

Are the private ranch setups adaptable to changes in method of operation, kinds and class of livestock, etc.?

What time and/or financial help can the permittee be reasonably expected to provide?

2.26 Administrative

What Forest Service Manual or policy requirements control what cannot, can, or must be done?

How much money is it reasonable to expend in installing and operating the management program?

What is the time, manpower, and technical expertise available for implementing and followup of the program?

2.27 Economic

What are the unit construction and maintenance costs for each type of range improvement that currently exist or may be proposed?

What are direct and indirect rancher costs for present management and for various alternatives.

What are the unit costs of performing allotment examination, followup, and evaluation studies?

What are the unit returns from grazing use and from other resource uses and activities?

2.28 Miscellaneous

What are the normal and the extreme precipitation patterns?

What range improvements currently exist - kind, location, condition, and maintenance responsibility?

What opportunities exist for additional structural and nonstructural range improvements?

What are other impacts on the resource - disease, insects, rodents, fire, floods, etc.?

2.3 CURRENT INFORMATION GAPS

Some items of relevant information are inadequate, not readily available, and/or not currently being fully used in management planning. Improved planning requires that these information gaps be identified and filled.

1. Good data on phenologic and physiological characteristics of individual species are inadequate.
2. Available herbarium information is generally not being fully and effectively used.
3. Generally, data on hydrology and geomorphology are inadequate, and soils and geologic information are not fully used.
4. Information on daily and seasonal livestock weight gains is generally inadequate.
5. Information concerning the permittee--his involvement and his operation--is not ordinarily used effectively in planning although such information is usually available.
6. Although general weather data are available, localized data are usually inadequate.
7. Records, both historic and current, of other site impacts such as disease, insects, rodents, etc., are generally inadequate.
8. Planning efforts on specific allotments will often reveal other data deficiencies.

CHAPTER 3

MANAGEMENT GOALS

Before undertaking the design of a management program, determination must be made as to what the program is intended to accomplish. Tangible and specific management goals must be described. These are the targets toward which the program is aimed. They are also the criteria against which management effectiveness must be checked. Valid choices in this area are a real test of an administrator's ability to manage public lands.

When one looks into the myriad of laws, regulations, objective statements, and other written material that emanates from the Secretary, the Chief's Office, and the Regional Office, there may be reason to question what the goals really are. After reviewing them as a composite, however, it becomes evident that there is one prerequisite and another overriding objective to be achieved in managing the range environment for livestock use.

The prerequisite that must be met in managing all resources is to apply management that will achieve site stability, and prevent site deterioration. This is strictly resource oriented. The overriding objective is people oriented. It is to manage the mix of resources so as to obtain those products and services from the land that yield the greatest possible contribution to the socio-economic betterment of the American people, and the needs of local rural communities.

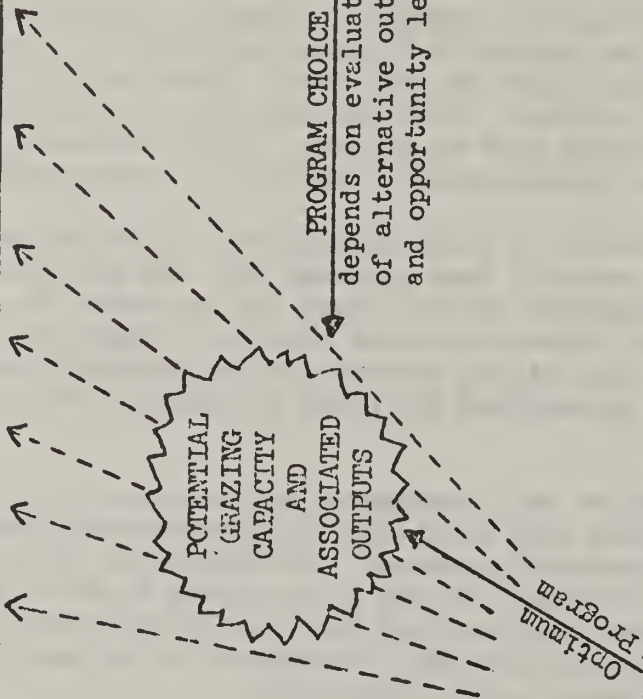
In range environmental management programs for range allotments it is essential that:

1. A base level program that will achieve soil stability and prevent site deterioration be provided.
2. The mix of output values that will best meet the needs of the American people and the local communities be planned for and provided.

Once these requirements have been determined and planned for, the manner in which the resources will be developed and managed for livestock grazing becomes the focal point in range allotment planning. How this livestock use can best meet the needs of the local permittees and provide benefits to the local communities is an essential consideration.

The following schematic drawing illustrates the way in which the allotment management plan should lead toward site stability and selected output targets.

PRODUCTIVITY POTENTIALS FOR VARIOUS OUTPUTS
BASED ON SITE CAPABILITY AND ANTICIPATED
DEMANDS.



PLANNING ABOVE BASE LINE
(Output Oriented)

Management goals based on sustained high level output of goods and services that contribute most to the socio-economic betterment of the associated rural communities.

MANDATORY BASE LEVEL TO MEET MINIMUM NEEDS OF THE SOIL AND VEGETATION--SITE STABILITY
(Restore site conditions to a satisfactory level or prevent site deterioration)

Minimum
Program

PLANNING BELOW BASE LINE
(Resource Oriented)
Pre-condition that must be satisfied by any acceptable management program

PRESENT CONDITIONS,
GRAZING CAPACITY, AND
ASSOCIATED OUTPUTS

3.1 RESOURCE PROBLEM ANALYSIS

Management of range environment must include the achievement and retention of the productivity potentials of the land. Use of the resource must not be allowed to impair productivity. This is fundamental to the sustained-yield mandate.

A management program must include those corrective steps needed to perpetuate productivity. For herbaceous vegetation, this condition is met by achieving site stability. Unsatisfactory resource conditions must be identified and the corrective measures described. The real key is the correct identification of the problems.

3.11 Problem Identity

The way a resource problem is described has a strong bearing on the variety of solutions available. A symptom is often identified as being the problem and, as a result, is misleading in the choice of solution. In identifying the resource problems, the basic issues must be daylighted. Problems must always be oriented back to something that is actually happening on the ground.

If, for example, "overgrazing" or "overutilization" is identified as the problem, then less utilization is the obvious solution. This solution implies a reduction in stocking. It has been applied repeatedly as a corrective measure in past years, often with questionable results. The real problem is something unacceptable that is happening to the resources because of "overuse." Suppose the problem is described as "Downward trend of vegetal condition is occurring," or "Desirable plants are low in vigor and dying." This identity opens up a variety of possible solutions because now the corrective measures must merely change the direction of trend or improve the vigor. The solution may now consider such things as changing the timing and nature of the use. It is no longer limited to a reduction in the level of utilization as a necessary part.

The point is, resource problem identity tied to the use immediately suggests less use as the solution. But problem identity tied to the resource itself leads one to look to vegetation and site requirements for a solution. This, in turn, may suggest changing timing and manner of impact rather than just the degree of impact.

3.12 Problem Location

It is equally important to know exactly where the problem situation occurs and how extensive it is. This allows the solution to be pinpointed to the problem. A broad brush solution often tends to either miss the problem entirely or to be unnecessarily severe. Both mistakes can be avoided by knowing exactly what is in need of correction and where it is located.

3.2 OUTPUT TARGETS

The land area contained in any range allotment has potential for producing a variety of output values. Both commodity and use or service values are involved. Each value has potential for increase up to the limit of site capability if other values are disregarded. To make a reasonable choice of goals from among these values requires an understanding of (1) site capabilities, (2) anticipated demands, (3) relationship of potential outputs to user and community needs, and (4) relationship of allotment potentials to those of all other associated lands, both public and private.

Choice of potential output values is based on those that will yield the greatest contribution to socio-economic betterment of the associated rural areas. The choice must reflect the best judgment of the needs of the people framed within the capabilities of the land. The permittee and his contribution to the local community must be considered as must the contribution of other users to the community. The relationship of the allotment to these contributions should be determined. The selected output targets can be expressed in terms of the livestock use but are chosen only after all output values and their relationship to each other have been evaluated.

The way that livestock use fits into the total picture should be documented in the management plan. In some areas the contribution of livestock use may be clearly of such importance that it should be maximized. More often, other output values will also be important and goals may be to develop two or more of the potential values to moderately high levels. In still other areas, the value of other outputs may dictate a minimum of livestock use. Areas in which base ranch capacities are the limiting factor will usually call for different output goals than those where base ranch capacities can be substantially increased. Dominant cow-calf operations will suggest a different kind of output target than yearling operations. Demands for various output values will also vary from place to place and will affect the evaluation.

Two decisions are required in selecting output targets. First, what level of livestock use is desirable in terms of correlating potential output values. Livestock grazing might range from full use of site potential to incidental use depending on other outputs. Second, what is the best way to capture the available value in livestock grazing. This might include such options as:

1. Modification of the season of livestock use.
2. Increase in livestock numbers.
3. Increase in beef or lamb production.
4. Increase average daily gains per animal.
5. Changes in kind or class of livestock.
6. A combination of all or some of these or emphasis on one of them may be appropriate for the allotment.

At best, these are difficult decisions to make. They involve an area of consideration that may have been neglected in the past. Nonetheless, the present atmosphere of public concern and increasing user pressure demands that we give it our best effort. It will become increasingly difficult to defend livestock grazing as a valid use of National Forest land unless it can be clearly demonstrated that its place has been fully considered in relation to other output values. Perhaps present trends toward coordinated and total resource planning for areas of land may simplify the job of making the socio-economic decisions.

CHAPTER 4

PLANNING AND PRESCRIBING

The next step is the formulation of a management prescription for the allotment. This step is called management planning. It consists of three parts:

1. Analyze the Facts.

Analyze the assembled information to determine what can and what cannot be done. Explore all possibilities, no matter how unlikely they may seem at the time.

2. Consider the Alternatives.

Assemble the possible solutions into a series of alternative prescriptions that might be applied. Many alternatives will differ only in certain parts, not in total. Although some aspects will, of necessity, be in written worksheet form, this process is essentially a mental one.

3. Choose your Recommended Solution.

Review the alternatives in terms of goals, needs, problems, and optimums from several viewpoints. In this way, select the best overall prescription for implementation. It is a good idea to keep two or three of the "runner-up" alternatives on tap also.

Management planning is not a procedure, per se. Rather, it is a reasoning and thinking process which must be gone through to come up with a well thought out and effective management prescription.

The material presented in the balance of this chapter may help to better understand the planning philosophy and to better organize the reasoning process involved.

4.1 ANALYSIS OF INFORMATION

First, define the optimum solution in terms of each of several factors independently. This does not mean that the chosen system will actually fit the optimum for any of these factors. However, the knowledge will help in the recognition of how much is being given up as the pros and cons of various possibilities are being weighed. The system which is finally decided upon should be the best combination of them as a group. Not all of the factors will be of equal importance and their relative importance will vary from allotment to allotment.

4.11

Some factors for which the optimum should be identified are listed here.

1. Needs or requirements of the vegetation and soil.
2. Needs or requirements of the animal (livestock).
3. Correlating Forest Service land with other lands.
4. Ranchers' capabilities, limitations, and desires.
5. Administrative capabilities and limitations.
6. Economics of installing and operating.

As a further aid in helping analyze the assembled factual information, a checklist of points to consider in identifying the "optimum" for each factor follows.

4.11 Optimum for the Vegetation and Soil

Grazing use usually results in some degree of adverse impact on the plants being grazed. Grazing system design must provide for recovery of the plants from this impact if site conditions are to be maintained or improved. The same relationship applies indirectly to soil conditions.

The application of systematic rest sequences in the grazing cycle is an effective way to achieve needed recovery. If complete recovery is not provided for, then site deterioration will occur. An acceptable management program must meet the following requirements:

1. Provide for the following physiological needs of desired plants. If these needs are met, the plant can do everything else for itself.
 - a. Vigor
 - Top - for maximum food production.
 - Roots - for greater nutrient intake and more organic matter in soil to feed micro-organisms.
 - b. Litter
 - To prevent surface sheet erosion (loss of colloids), to provide more organic matter for micro-organisms, and to provide plant nutrients directly from decomposition.
 - c. Reproduction - to grow more plants and replace old ones, (seed production and seedling establishment).
2. Provide for continued maintenance of soil fertility by:
 - a. Aeration - prevent compaction or allow for periodic recovery from compaction.

b. Adequate litter cover to:

Supply organic matter to soil.

Maintain good surface structure for infiltration.

Prevent erosion and loss of surface soil layer.

3. Correct existing erosion problems by:

Seeking out the erosion source and applying corrective action.
(CAUTION - Many erosion problems will correct themselves under the proper grazing system without artificial treatment.)

4.12 Optimum for the Livestock

If maximum yield of animal products from the land is desired, then some conditions which help to accomplish this are:

Grazing the plants at point of maximum nutritive quality.

Bring forage production to full site potential. (If time is urgent, artificial treatment may be desirable.)

Adjust plant composition to desirable forage species. (Artificial introduction of desired species may be practical.

Arrange units so as to minimize need for driving livestock.
(Drift when necessary.)

Plan range improvements, herding, salting, and other techniques to achieve uniform distribution of use. (Abundant and well distributed stock water is important.)

4.13 Optimum for Management Effectiveness

An extremely important but often ignored element in quality management planning is the consideration of land areas other than the National Forest grazing allotment. Such lands may include private and State ownership, other Federally-owned lands, and other adjoining forest allotments. The most effective grazing system may involve dividing or combining allotments, and/or including lands of other ownership as an integral part of the system. Landownership and allotment boundaries should not be a barrier to management planning. The administrative problems often associated with boundary changes should not preclude giving these possibilities serious and thorough consideration in system design.

4.14 Optimum for Rancher

It may be desirable to seek maximum rancher participation but it is pointless to design a management prescription which goes beyond his capabilities. The rancher is an integral part of any successful

management program. He performs much of the "doing" phase of grazing system implementation. It is in his area that much of the direct output must be measured. The management program should fulfill a need in his total operation. Consequently, the use of National Forest rangeland in relation to the rancher's total operation is a fundamental necessity. The management program should contribute both to the profitmaking and to the productive capability of his operation in the most effective manner possible.

4.15 Optimum for the Administrator

It is pointless to design a management prescription with demands that exceed the finances, time, and/or manpower available to the administrator. This is particularly important in regard to evaluation followup needs. These types of commitments are often overlooked until too late.

It is also pointless to design a management prescription which is contrary to or in conflict with established policies and standards.

4.16 Optimum for Economics

Determining the optimum for this factor is a function of economic analysis. Refer to FSH 2209.24 for instructions and details on the subject.

4.2 CONSIDER THE ALTERNATIVES

After completing the preceding analysis, a few to several possible or alternative prescriptions or solutions should become evident. Through weighing the pros and cons of each, the one judged to be best can be selected. The first solution that comes to mind probably represents the typical approach to this type of situation. Recent experiences will tend to dominate. But does it offer the best possible solution or should the decision consider some other type of action? By considering a wide array of alternatives, opportunities are less likely to be overlooked. When considering alternatives, it is usually helpful to first look at management systems and development work separately.

Management systems may cover a range of intensity levels. One may give an equally satisfactory response as another, but require much longer to do so. Others will vary widely in the costs and effort of implementation. Often the system which appears to give the best results most quickly will not be the most practicable one to apply. Those possibilities which will not yield acceptable results may be rejected at once. The remaining possibilities, then, would all be acceptable in terms of correcting the problems and leading management toward the stated goals. It is from this group that the final choice will be made.

Development work, too, can be planned at a variety of intensities ranging from immediately implementing all possible development to installing only the minimum facilities necessary to the system. The final choice may fall at any point on this scale. .

4.21 Predicting Potential Grazing Capacity

The predicted results of proposed programs are a key basis for choosing between valid alternatives. Once the needs of the vegetation and the site itself are met, a number of resource outputs are available. Grazing capacity is one of these. It must be considered in relationship to all of the others and to the management goals for the allotment.

Predicting potential capacity involves careful evaluation of the following points:

1. An estimate of forage yield increase due to development work.
2. An estimate of forage yield increase due to improvement in vigor and condition.
3. An estimate of use patterns resulting from management and improvement changes.

These predictions must then be modified by evaluating the following constraints:

1. Management limitations which affect the amount of forage that can be physically harvested (i.e., water shortages).
2. Lower levels of use imposed by coordination needs.
3. Economic considerations.
4. Relationship of potential grazing capacity to the management goals for the allotment.

The resulting figure is an estimate of post-program grazing capacity. If, by the time the program is fully implemented some things are found to deviate from predictions, the estimate may be modified accordingly. However, if predictions have been carefully made, such modifications should be minor.

4.22 Economic Analysis

A useful tool for evaluating the various alternatives and determining the most feasible one is called "Economic Analysis."

What is an economic analysis? It is an analysis of the economic impact of a proposed course of action. It includes a detailed study of all benefits and costs associated with any particular plan. It may be varied in intensity and form from very simple to extremely complex.

If sufficient data are available and the analysis properly carried out, management decisions will become much easier. Detailed information on the relative values of proposed actions should be before the manager so he can weigh the impact of various decisions. Many decisions involve

values other than monetary ones, but there should be an awareness of what the trade-off in efficiency will be for selecting a program on some other basis.

Following is a summary of the elements involved in developing an economic analysis. Detailed guidance may be found in FSH 2209.24.

1. Basic Data Requirements.

- a. What products or services are required?
- b. What are physical production opportunities?
- c. What inputs are required?
- d. What is the time frame of the analysis?
- e. Determine value indicators.

2. Selection of Most Efficient Combination of Resources.

- a. Evaluate all tangible benefits.
- b. Evaluate all tangible costs.
- c. Discuss intangibles.
- d. Analyze alternatives.
- e. Select most efficient arrangement of resources.

3. Selection of Most Efficient Plan.

- a. Complete steps 1 and 2 for alternative plans.
- b. Compare economic factors to determine most efficient plan.
- c. Compare intangible factors.
- d. Select most efficient and practicable plan.

4.23 Environmental Analysis Report

An Environmental Analysis Report will be prepared for the program as a whole. It is a part of the planning job and must be ready for approval consideration concurrently with approval of the selected management program. The report will consider all planning detail available at the time. Additional reports may be needed later for specific project elements of the program as more planning details become available.

4.3 CHOOSE THE PRESCRIPTION

From the evaluation of the possible alternatives, the prescription considered to be the best or "ideal" for the allotment can be selected. A sound decision will have considered some points in addition to the acceptability of results. Important among these considerations is its salability--and it must be sold. Organizationally, it must be sold to the approving officer. From a practical standpoint, it must be sold to the permittees. To be effective, it must be the permittee's prescription as well as the Forest officer's, and the permittees must have been intimately involved in its formulation. Further, it has become important in recent times for a program to be salable--or at least defensible--

to the various segments of the public who are becoming more involved in the decision making process.

There is generally more than one satisfactory way to solve a problem. Alternative methods should be presented in nearly all cases. If the first choice won't sell, perhaps the runner-up will.

The purpose of any prescription is to attain the stated management goals for that allotment. Usually, it will be necessary to yield somewhat from the optimums for some or all of the factors. But never yield on the minimum needs of soil and vegetation that must be met. Consider, in order of value, the items that could be sacrificed and still move toward the goals. Don't settle for less.

Before concluding this step, it is desirable to recheck the validity of the decision by asking the following questions:

1. Will it actually solve the resource problems and achieve the desired output targets?
2. Does it form policy, set precedent, or violate existing policy?
3. Has it been tried or tested before? Don't reject a solution just because it hasn't been tried before, but be cognizant of its newness.
4. Has it been thought all the way through to final application? Are unexpected questions or problems liable to arise when the program is applied?
5. Will it require administrative followthrough? By whom? How soon? How much?
6. Is it a permanent solution? Can it be stopped or discontinued if necessary?
7. Will it leave flexibility for other courses of action?
8. Is it good economy?
9. Has it been sold to the permittees?
10. Is it acceptable to other segments of the American public?
11. What will be the long-term and indirect costs and returns?

If the selected prescription still appears valid and defensible, the next step is to document the prescription in the written allotment management plan.

CHAPTER 5

THE ALLOTMENT MANAGEMENT PLAN

The allotment management plan is the written documentation of the management prescription, including a summation of its derivation and the method and schedule for its implementation and followup. It may include maps and other graphic materials that aid clarity of presentation. It will include a statement of management goals for the allotment.

5.1 PURPOSE

The purpose of the management plan is to set forth in a clear concise manner, how the resources on the allotment will be managed, but it does more than this.

1. It is a useful tool of presentation for I&E and negotiation purposes.
2. It maintains continuity of effort through changing personnel.
3. Its development can and should be a forum for involving the permittee in the planning and management of the range allotment.
4. It helps to assure a more complete assembly of information in support of decision making.

The plan should be objective and set up in such a way that someone else can retrace the same steps using only material contained in the plan.

5.2 FORMAT

The contents of a good plan logically fall into five categories, namely: (1) information, (2) analysis, (3) action, (4) followup, and (5) reference. The arrangement of material in the plan should be grouped in comparable sections. Each plan must also include a statement of management goals for that allotment in order to give a sense of meaning to it.

The plan must be long enough to clearly and completely present each area of subject matter. For some small allotments with simple prescriptions, a few pages may be ample. Large allotments with complex prescriptions may need considerably more detail to tell the complete story. Because of the wide diversity among allotments, the volume of detail and number of subheadings needed will vary widely.

The management plan should provide answers to the following questions:

- What is wanted from the allotment? (Management goals)
- What is there to work with? (Information)
- What is standing in the way? (Problem analysis)
- What is the most practicable solution? (Prescription)
- What action will be taken to apply the solution? (Management plan)
- How is the effectiveness of the solution checked? (Followup)

Section titles and sequence should be uniform but the details of presentation within each section are left to the planner. This chapter presents a tickler list of items that may be considered for inclusion in the appropriate sections.

5.21 Information Section

This section is a summarization of pertinent basic facts and other related information. It should be concise but must include all information essential to analysis and development of the management prescription. Where practicable, this information should be presented in graphic or tabular form. Greater detail on pertinent points can be included in the "Reference" section of the plan. If the volume of available data exceeds about two pages, subheadings should generally be used.

The following list covers most of the kinds of information that may be included in this section.

1. History of range use and other past events.
2. Current status of permits. Include permittee's names, livestock numbers, established grazing season, etc.
3. Current status of management. Describe the current allotment management program.
4. Condition and trend of the resource. Summarize acreages (preferable tabular) in various condition, trend, and suitability classes and vegetal types. The summary is derived from a compilation of the range analysis field inventory. Data on both vegetation and soil should be included as needed. This information is more useful if tabulated by proposed management units.
5. Estimated current grazing capacity. This estimate is based on existing management systems and improvement facilities, and the quality of current on-the-ground application.
6. Existing improvements. Itemize those structural and nonstructural improvements now existing on the allotment, including their condition, adequacy, need for reconstruction, etc. Since this item will be repeated, for the most part, in the "Action" section of the plan or is available in the range improvement inventory, it may be handled by cross reference. It must, however, be readily available for analysis.

7. Importance of the range to permittees, communities and other users. Discuss the social and economic relationship of the allotment to people. Include such relationships as product values, dependency, commensurability, turnover, cost of operations, etc.
8. Special problems and conditions. Identify such items as critical areas, poisonous plant or predator problems, etc.
9. Miscellaneous existing conditions. Suggested for inclusion are climatic data, administrative requirements and limitations, and a summary of other uses and activities on the allotment.

5.22 Management Goals

This section should state in specific terms those resource problems that must be corrected by the program and those output values the program is designed to produce.

1. As a part of any acceptable management program, unsatisfactory resource conditions on the allotment will be identified to assure that corrective measures are included in the management prescription. Documentation should include the "what" and "where" of the problems. Examples of common problem situations include the following:
 - a. Downward trends in soil or vegetation condition.
 - b. Site deterioration due to livestock trailing.
 - c. Direct conflict with other uses such as timber plantations, campgrounds, etc.
 - d. Insufficient ground cover to prevent accelerated erosion.
 - e. Excessive direct competition between livestock and big game.

The description in this section should state specifically what the unacceptable things are and where they are occurring.

2. Each allotment has potential for a variety of outputs after site needs have been met. In order to provide a sense of direction or meaning to the management program, choices must be made from among these output options. The choices should reflect the best judgment of the needs of the people framed within the capabilities of the land. The output targets must be arrived at by considering the whole spectrum of possible outputs. All outputs will be considered in the economic analysis. However, only those directly or indirectly involving livestock need be described in this section.

Selected livestock oriented output choices may relate to:

Maximum numbers of animals.
Extended grazing seasons.

Maximum production of animal products.

Maximum weight gains per animal, etc. or to indirect relationships such as: using livestock as a tool to manipulate vegetation for enhancing other output values (aesthetics, big game habitat, water yield, etc.). It could also be desirable to orient the management program toward maximum employment of people.

5.23 Analysis Section

This section should brief the pertinent elements of the analysis which lead to the acceptance or rejection of various management alternatives. It should clearly bridge the span between raw information and the chosen prescription. Contents may include the following:

1. Site and use requirements and limitations.

Give a concise description of physiological requirements of plants, ground cover needs, soil disturbance limits, livestock tolerances, site potentials, etc., and the actions needed to meet these requirements.

2. Relationship to associated lands.

Describe the relationship of associated lands, both public and private, to the allotment. Explore the opportunities for combining and/or dividing allotments, integrating State, BLM, and privately owned lands into the management system, etc.

3. Management and development opportunities.

Describe at least the more likely of the grazing formulas and range improvement possibilities. Point out the desirable and the adverse features of each.

4. Potential grazing capacity.

Based on potentials under various combinations of management and treatment, indicate the potential outputs in increased grazing capacity and/or in other resource values that would result.

5. Relationship with other uses and activities.

Place the environmental analysis report of the proposed program in the "Reference" section and cross reference it to this section.

6. Economic analysis of opportunities.

Economic analysis working papers may be placed in the "Reference" section and cross referenced to this section. Evidence which leads to the acceptance or rejection of various possibilities should be documented to support the choice decided upon. Include the analysis of program options and alternative levels of investment, where applicable.

A part of the justification for a program is to show why a particular livestock output target was chosen and how its accomplishment fits in with other values. When no economic analysis is made, the analysis of program options and output choices should be documented in this section.

5.24 Action Section

This section should describe the program to be applied to the allotment. It must include both the management prescription and the needed implementation action.

1. Selected management prescription.

The prescription can be effectively presented in three parts:

- a. Describe the management system (grazing formula) to be applied. Include charts of the rotation scheduled as needed. Show the distribution of potential grazing capacity between management units and a statement of the initial stocking rate and grazing season to be tested when the program is operational. The description should include a resume of results the formula is designed to accomplish in terms of plant growth requirements, soil and site needs, livestock responses, coordination requirements, etc. It should show how the selected formula can yield the expected results.
- b. The development system (range improvements) should be described in detail. This information can be effectively shown in tabular form. It should include a list of existing improvements that will be retained, improvements needing reconstruction, and all new improvements planned. Each entry should show names, locations, installation and maintenance costs, and timetables to the extent possible.
- c. To assure understanding of the prescription, the details should be shown on a map. As a minimum, this map should depict the planned management units, and all existing and planned improvements and pertinent study locations. The map may be placed in the "Reference" section and cross referenced here.

2. Correlation with other uses and activities.

Tell specifically how needed coordination called for in the environmental analysis report is to be achieved.

3. Administrative action needed to implement the program.

Outline the specific actions needed by showing what must be done, who will do it, and when it will be done. An action timetable can be effectively used. If adjustments in permitted numbers or period of use are needed, provide a table showing distribution of the adjustment by individual permittees.

4. Interim programs.

Often, the planned grazing program cannot be immediately applied. However, interim actions can often be taken to improve existing conditions. In such cases, describe the interim management program. Even in cases where implementation of the program is started immediately, there is often a period of a few years before it becomes operational. Different numbers, seasons, and/or management schemes will often be employed during this period and should be described.

5. Review of alternatives.

In most cases, the final prescription will be selected from among several options, some of which were also practical but less desirable in some respect. Key points of alternative programs that will yield acceptable results should be outlined. Any alternative that will not restore deteriorated site conditions or prevent site deterioration must be rejected and need not be described.

5.25 Followup Section

1. Examination and studies.

Needed on-the-ground followup should be shown, including both implementation and evaluation followup. Assignment of personnel, description of techniques, and schedules for doing should be outlined as needed. A job list is an effective way of presentation.

2. Modifying and improving the program.

Most programs can be improved. Desirable modification will become evident with application. This need should be anticipated and provided for in the plan. Responsibility should be outlined for who is to make the indicated changes and how they are to be made.

5.26 Reference Section

This section serves as an appendix. Contents may include such things as:

1. Environmental analysis report.
2. Economic analysis working papers.
3. Miscellaneous maps and charts.
4. Miscellaneous range environmental analysis data.
5. Cooperative agreements.

5.3 MAINTENANCE AND REVISION

Most management plans become gradually outdated over time. Usefulness of the plan can be retained if it is currently maintained and periodically revised to keep abreast of changes.

Maintenance of the plan should be scheduled as an annual job item in the Uniform Work Planning System. All changes and corrections found needed are incorporated into the plan by pen-and-ink notation. Changes, other than editorial ones, should be referred to the approving officer for his concurrence.

When the volume of pen-and-ink notations becomes unwieldy or a need for change in goals or major program alteration becomes evident, the plan should be revised.

CHAPTER 6

PROGRAM IMPLEMENTATION

Actions prescribed in the management plan must be accomplished on the ground. Their effectiveness must then be evaluated in terms of desired results and all needed modifications made. Such followup may be simply summarized as follows:

Make it clear exactly what is wanted and how it will be done.
Check compliance and results.
Was it done as planned?
What were the results?
If it was done as intended, did it give the expected results?
If something didn't work right, adjust and test it again.

The followup phase is started by implementing all parts of the designed program according to plan.

6.1 DEVELOPMENT PLAN

The development plan includes such things as financing, cooperative agreements, contracting, 1300-4's, and other items needed to start action on the planned development work. The real key is to provide enough project supervision and inspection to insure that work is done as intended. Changes in planned work can be made but they should be by intent and not by accident. Good project planning must include provision for needed time, money, and manpower to meet this requirement.

6.2 GRAZING MANAGEMENT SYSTEM (Grazing Formula)

The permittee's annual plan of use is the working tool that applies the grazing system to the ground. The annual plan must spell out exactly what the permittee is to do during the current year to carry out the system design. These actions must then be assured by checking for compliance.

6.21 Permittee's Annual Plan of Use

As the name implies, a plan of use is prepared annually for the grazing allotment. The annual permittee plan is the action plan that implements management decisions during the current year. It is the working agreement with the permittee for carrying out the prescribed management action.

Annual plans of use should be mutually developed by the District Ranger and permittee. The permittee must understand the management goals for the allotment and how the annual plan is used to reach these goals. He must understand clearly his role in program implementation. The plan

should spell out clearly and concisely what the permittee is expected to do both in meeting management action and in correcting unsatisfactory practices. The permittee's annual plan of use will consist of two sections - written and graphic.

1. The written section will include, when applicable:
 - a. Clear and definite instructions for management of livestock while on the allotment.
 - b. Range improvement maintenance responsibility for the current year.
 - c. A list of range improvement projects to be started or completed during the current year. (Show part contributed by Government and by the permittee.)
 - d. Special instructions on camp sanitation and fire prevention responsibilities of permittee.
 - e. Multiple use coordination requirements with which the permittee is expected to comply.
2. The graphic section should include:
 - a. A map showing allotment and management unit boundaries.
 - b. Range improvement locations.
 - c. Closed areas and special management situations should be shown on the map.
 - d. Acceptable forms for recording actual use, losses, and other management data.

6.22 Allotment Examination

Although the allotment examination is primarily a part of the evaluation phase, two aspects of it relate to program implementation. These are (1) livestock accountability, and (2) checking for compliance with the permittee's annual plan of use. They will usually be accomplished at the same time as evaluation followup. Permittees should be invited and encouraged to participate.

1. Livestock accountability is an administrative task based on the need to control permitted livestock numbers and prevent unauthorized use. Most actions to assure livestock accountability are taken before the livestock are on the allotment. Dye marks, ear tags, brands, and other identifying marks should be routinely observed during each allotment examination.
2. Field checking for compliance with the annual plan of use is an important function of allotment examination. The need for this kind of followup varies with size of allotment, complexity of the management system, cooperative attitude of the permittee, and other factors. A check for compliance should be made as often as is necessary to be sure the management instructions are being carried out as intended. Deviations should be noted and the needed corrections made in the following year's plan of use.

6.3 RANGE EXAMINATION NOTEBOOK

The examination notebook is a working tool to systematically collect and record data and information that are essential for a professional job of grazing management. It will be prepared for each allotment and kept current. If the notebook is carried in the field at all times, examination notes can be recorded incidental to other business.

The notebook should contain all items needed in the field to determine adequacy of management and to record essential followup information. The way in which the notebook is bound is optional. For ease of carrying, items for each individual allotment may be bound separately in manila folders. Some prefer to bind them in heavy looseleaf binders.

Required items for the range examination notebook include:

1. Current "permittee's annual plan of use."
2. Grazing record form (R4-2200-2) showing permitted use and livestock counts, brands, etc.
3. Unit examination record (form R4-2200-15) or similar form for recording evaluation followup data.
4. Aerial photos, photo mosaics, topographic map, or other graphic material on which to sketch use distribution patterns and intensities.
5. Grazing impact analysis and summary (forms R4-2200-8 and R4-2200-3).
6. Study site impact record (Worksheet).
7. Examination "tickler" list or job list developed from Uniform Work Planning priorities.

Optional items for the range examination notebook include:

1. Allotment management plan.
2. Allotment record and analysis (form R4-2200-23).
3. Range analysis maps.
4. Record of range studies and study site locations.
5. Study site characteristics form (Worksheet).
6. Excerpts from functional supervision, GFI, or GII reports pertaining to the allotment.
7. Local species lists, soils, hydrologic, and geologic papers as available.

CHAPTER 7

EVALUATION FOLLOWUP

Evaluation followup described in this chapter relates to the planned-rest model. Followup under the key area-key species concept is described in the Range Environmental Analysis Handbook (FSH 2209.21).

This chapter discusses the kinds of information needed, why it is needed, what it is used for, and suggests some ways in which it may be gathered. Although several more or less systematic procedures for doing various parts of the followup are described, the task is basically one of applying good judgment and common sense. Evaluation followup may be described as the gathering of sufficient information so the manager knows what is happening on the ground, why it is happening, and then, doing whatever needs to be done about it.

7.1 PURPOSE AND OBJECTIVES

Predictions of post-program results made during planning must be tested and firmed up under actual use. Evaluation followup is the process by which the firming up is done. It has three major elements.

1. Firming up the initial or test stocking rate.
2. Modify the program as needed to get it operating properly.
3. Confirming the acceptability of results through long-term trend studies.

Evaluation followup is specifically made to determine if the management program is yielding the desired results. Is it accomplishing the management goals established for the allotment?

Evaluation data also is valuable in indicating needed modifications and improvements in the management program. Is the program functioning satisfactorily? If not, what can be done to correct the problems?

Considerable attention must be given to evaluation followup during the years immediately following implementation. Usually, this phase--the "debugging" period--will extend through the first full cycle of the management system. At that point, the system should be operating fairly smoothly and opportunities for improvement found and applied.

No program can be considered as static and final. Goals are subject to periodic change. Physical environmental conditions are dynamic and constantly changing over time. For these and other reasons, evaluation followup on a less intensive scale must be continued indefinitely so that the program can move with the changes.

7.2

Sufficient evaluation followup will be performed to accomplish the following objectives.

1. To check on compliance with the annual plan of use.
2. To gather data and information on actual results.
3. To make needed changes and improvement in the management scheme and the development program.
4. To check actual results against those needed to accomplish management goals for the allotment.
5. To firm up the stocking rate being tested.
6. To make needed changes in next year's plan of use.
7. To keep abreast of apparent trends of vegetation and soil.
8. To gather data and information needed for interpretation of both apparent and long-term trends.
9. To check program effectiveness and accomplishment through measurement of long-term trend.

7.2 ALLOTMENT EXAMINATION

Use of allotment examination and the "Range Examination Notebook" are necessary on allotments under the planned-rest model as well as those under other management systems. The timing and frequency of examinations and the nature of information recorded will differ somewhat, however.

Preplanning of field tasks should be done so that scheduled time can be used effectively. Some information can usually be gathered incidental to other work. However, planned allotment examination is the principal tool of evaluation followup.

7.21 Timing and Frequency

Examinations should be made each time and at about the time livestock enter a new unit. Additional interim examinations may also be desirable to check compliance with the plan of use. Phenology, forage production, vigor, apparent trend indicators and similar information should be recorded for the unit the livestock are entering. The amount and distribution of grazing impacts should be recorded for the unit they have left. Where movement of livestock from one unit to another occurs over an extended period of time, measurement and recording of grazing impacts in the used unit should be delayed until most of the livestock have been cleared out. This may not occur until the end of the grazing season.

7.22 Record Keeping

Data and notes should be recorded and assembled in a meaningful and usable format on a unit-by-unit basis. This applies to data from study sites as well as data for the unit as a whole. It is desirable to summarize some kinds of information on an allotment basis also, but it should still be identifiable by units.

The forms and techniques described are suitable for evaluation and record keeping. Some of them can, no doubt, be modified to better fit local situations. The kind of information recorded is the important thing, not the format in which it is recorded.

7.3 JOB COMPONENTS

Evaluation followup techniques will vary according to need but are primarily observational. Components of the followup job element are:

1. Annually record on form R4-2200-15 or a similar form those actual impacts and observations for the unit as a whole that are noted during allotment examinations.
2. Annually prepare a sketch map or notes that show the intensity and distribution of forage utilization on used units.
3. Interpret actual use patterns and intensities in terms of recorded apparent trend indicators, livestock responses, coordination requirements, and management goals.
4. Determine need for program modification to improve distribution and to achieve desired results.
5. Note needed changes to incorporate into the next year's annual plan of use.
6. Recalculate stocking rates for further testing as necessary.
7. Select study sites (bench marks).
8. Establish needed long-term trend studies.
9. Annually record on Study Site Impact Record worksheet those actual impacts on study sites that are needed to interpret trends.
10. Periodically remeasure and interpret trend studies as necessary to confirm that desired resource conditions are being achieved.

7.31 Unit Examination Record Form R4-2200-15

Field collection of certain items of information is mandatory if the initial stocking rate is to be firmed up and the program "debugged" objectively. The Unit Examination Record (form R4-2200-15) provides a means for recording such information. This form is basically a "tickler" list to insure that needed information is noted and that the notes are organized into usable form. The permittee and/or herder are good sources of information for many of these items. Each item on the form is further explained as follows:

1. In evaluating results of the program it is important to know how much actual use was involved in causing the impacts observed. Numbers of animals by kind, age classes, and date of movement from one unit to another should be recorded as accurately as possible. This should be the best estimate of all uses, whether permitted or not. Permittees and their herders can do an excellent job of providing this record if they are properly instructed and trained.
2. Knowledge of the phenologic characteristics of important plant species is fundamental to the design and improvement of planned-rest management systems. Usually, the original system design has to be based on estimates or approximations. More specific data is needed. The allotment examination provides an opportunity to add data and, over time, will accumulate ample information for management purposes. Records should be made at about the time livestock enter a unit so observations are not unduly handicapped by trampling and cropping. Each note must be specific as to date, species, and stage of growth. For diversified units in which plant development varies from place to place, a brief description of the specific site is also helpful. Suggested developmental stages follow.

Grass and
Grasslike

Leaf
Boot
Bloom
Dough
Seed maturity
Curing

Forbs

Leaf
Early bloom
Peak bloom
Late bloom
Seed maturity
Curing

Shrubs

Bud Stage
Early leaf
Flowering
Mature leaf
Seed maturity
Post-seed

3. and 4. For the most part, indicators of apparent trend are responses of the environment to the impacts imposed on it. Usually, they are responses that, if continued, result in condition trend. Hence, they provide a very important guide to current management. Among the vegetation indicators to consider are general plant vigor, age class distribution in the composition, seed production, seedling occurrence, growth form of shrubs, mechanical damage to plants, etc. Soil indicators to consider include quantity and dispersion of ground cover, litter breakup and buildup, mechanical soil displacement, current rilling and gullyng, appearance of old gullies, surface soil losses and depositions, etc.

5. It is well known that herbage production may fluctuate widely from year to year, primarily because of climatic variation. Grazing capacity tends to parallel this fluctuation. However, stocking rates cannot be varied so freely and should be stabilized at some point approximating the normal grazing capacity level. Data must be available from a representative site to relate each year's conditions and accompanying impacts to this middle ground. If data indicating normal production for the site is already available, this entry can be shown as percentage of that norm. If not, then the entry should be an estimate of the actual yield in pounds dry weight per acre for the year.
6. To the extent that time permits, this item should be completed by use intensity mapping of the unit and cross referenced on this form. Where time does not permit the preparation of this map, notes based on observations should describe use patterns and the general intensity of use for various parts of the unit. The notes should indicate the general size of area in each use intensity classification. This information is needed to modify and improve the program and to firm up the stocking rate. Where distribution problems are apparent, possible remedies should be noted. For example, development of additional water sources, drift fences, changes in herding and/or salting practices, etc., should be indicated.
7. Livestock reaction may often be a limiting factor in the successful operation of a management program. It is one of the more obvious indices to opportunities for improving the system. In this item, consider the pertinent comments of herders and permittees.
8. Among the constraints that bear careful watching are those that concern the relationship of grazing impacts to other resource uses and activities on the unit. These should have been daylighted by the environmental analysis report and the necessary coordination measures designed into the management program. It is important to know whether or not these are meeting the need so that program modification can be applied if needed.
9. Continuity of management effort requires a record of those items that should be placed in next season's plan of use. For example, the distribution directed by the plan may have resulted in uneven utilization which can be improved through changes in the succeeding year's plan. Another example would be where management, as directed by the plan, resulted in damaging use to a sensitive area. This should be corrected in the next year's plan. These should be noted while fresh in mind. Deviations from current instructions should also be documented here. In addition, miscellaneous comments such as poison plant areas, noxious weed infestations, predator attacks, trespass problems, and other items that will help to improve the design and/or operation of the management system are appropriate.

UNIT EXAMINATION RECORD

FOREST _____ RANGER DISTRICT _____ YEAR _____

ALLOTMENT _____ UNIT _____

1. Number of Livestock and dates of use

Total AM use _____

2. Phenology3. Indicators of apparent vegetation trend4. Indicators of apparent soil trend5. Relative herbage production6. Use intensity and distribution patterns7. Livestock reactions8. Effectiveness of coordination measures9. Other Remarks

Guide for Completing the Unit Examination Record

(Collect data by field observation. Initial and date all entries. Use telegraphic style of writing. Use additional sheets as needed.)

1. Enter numbers of livestock and dates of use as accurately and in as much detail as you can. Breakdown by age groups is desirable. Permittees and/or herders and riders are a good source of information.
2. Note the specific flowering and seed maturity dates for important forage species in the composition. Mature seed has usually lost its green color and is difficult to compress between thumb and forefinger.
3. Note vigor of the plants and seedling establishment. Relative seed production is also an important indicator to note.
4. Note the relative amounts of displacement, compaction, current rilling and gullying, surface soil losses and depositions, and other indicators of apparent soil trend.
5. Estimates of current herbage production are used in firming up stocking rates and establishing the spread of annual variations. Estimates should be in terms of pounds dry weight per acre if such information is available. Otherwise, they should be shown as a percentage of the norm.
6. Record overall use of total available forage by showing distribution patterns and relative use intensities. Describe locations and general use levels. Sketching of use intensity patterns on a map is generally preferable to notes for recording this information. If mapping is used, cross reference this item. Periodically recheck the accuracy of ocular estimates.
7. Record livestock reaction to the grazing system using field observations and information obtained from permittees. Note adequacy of feed and water, trailing distances and frequency, movement problems, fence walking, congregation, weights, and relative physical condition.
8. Investigate the effectiveness of the management system in meeting coordination requirements. Note those situations that are working effectively as well as those that are not.
9. Note all deviations from instructions in the annual plan of use as well as other items that will help to improve the design and/or operation of the management system. Note items that should be placed in the annual plan of use for next season.

7.32 Mapping Use Patterns

A map showing the intensity and distribution of use is extremely useful in evaluation followup. Such a graphic record aids materially in evaluating the management program by pointing up weaknesses. It helps the manager identify desirable modifications and improvements in the program. It also simplifies the task of firming up stocking rates.

The use pattern map can be developed by various techniques and at differing intensities. The most practical for a given situation will depend upon several factors such as (1) kind of livestock and known distributional characteristics, (2) topography, (3) size of unit and management intensity being applied, and (4) available time and manpower for the work.

Ideally, the graphic result should be sufficiently detailed to show the irregularities of use distribution patterns. Otherwise, the needed management modification cannot be properly identified and applied. On the other hand, overly detailed mapping wastes valuable time without yielding practical management applications.

Use pattern mapping should be done on a unit-by-unit basis and at about the time the livestock leave the unit or soon thereafter, while the visual effects of utilization are readily apparent. Supplemental information needed for study site records and for the unit as a whole may often be gathered at the same time.

Mapping is done by forage-use intensity classes rather than by specific utilization percentages of individual species. Classification is done by ocular estimate. As a prerequisite, the examiner will need to have made sufficient quantitative measurements in similar types to "set his sights." He must be able to recognize levels of utilization by broad classes. Experience has demonstrated that this is easy to learn. Consistency in classification is more important than precision since we are more interested in distribution of use than in degree of use. For this reason, one examiner should do all of the mapping on a given unit.

Suggested Forage-use Intensity Classes

<u>Use Intensity Class</u>	<u>1/ Forage Utilization</u>	<u>Use Class Symbol</u>	<u>Color Code</u>
Negligible	0-10%	N	White
Light	11-30%	L	Blue
Moderate	31-50%	M	Green
Heavy	51-70%	H	Yellow
Very Heavy	71% and over	V	Red

1/ Overall utilization of all forage species.

1. Techniques.

Various mapping techniques can be used for recording the use pattern of a unit. Three of these are described. For most situations the sketch method is preferred.

a. Sketch Method

The unit is examined by reconnaissance and boundaries of forage-use intensity classes are sketched freehand directly on aerial photos, topographic map, base map, overlay, or other material. A fixed or systematic coverage of the unit is not necessary but a preplanned route of travel will improve efficiency. The unit must be traversed well enough to yield the desired mapping detail. As a general rule, minimum area delineation of 40-50 acres will provide sufficient detail for management purposes. It may be desirable to map some important situations to a finer detail. Other situations may require less detail.

In applying this method, no plots are used. The perimeters of use intensity classes are merely sketched as they are observed. An estimate of the relative forage production should also be made and recorded for each use intensity class sketched. After mapping the unit the graphic information may be transferred to an allotment map. The forage-use intensity classes delineated on the map may then be colored to emphasize the graphic presentation.

The sketch method of use pattern mapping is best adapted to areas of rough, broken topography with narrow canyon bottoms and scattered patches and stringers of suitable range. It is a relatively rapid way to record the desired information.

b. Grid Method

This method of use pattern mapping differs from the sketch method principally by its use of systematically located ocular-estimate plots to delineate forage-use intensity classes. The graphic end product is the same by either method.

The grid method is best adapted to areas of smooth to moderate terrain with larger blocks of suitable range. It is much more time consuming than the sketch method and, for this reason, may have to be limited in application.

The unit is examined on the ground and forage-use intensity classes are recorded for systematically located 100-square-foot ocular-estimate plots. The plots are located in a grid fashion over the entire unit. Direction of the rows should be at approximate right angles to major topographic features such as streams and ridges. Spacing between plots and rows is used to control mapping intensity. A spacing of 20 chains between plots in rows one-fourth mile apart will yield 16 plots per section or a 40-acre minimum mapping intensity. Ordinarily, this should be about as detailed as can be effectively used for management purposes.

Accuracy of distance measurement between plots and rows is not critical. Pacing gives adequate accuracy. In fact, with a little practice, the pacing of a saddle horse will serve as well.

As each plot location is reached, the examiner visualizes a 100-square-foot plot, estimates the forage-use intensity class for the plot, and records the estimate on a plot record work sheet. The plot is not actually marked out on the ground and no quantitative measurements are made. In addition to recording use intensity class by plot, the examiner should note and record key situations between plots. These would include such things as streams, ridge-tops, cover type changes, roads and trails, direction of travel, etc. Such notes are very helpful in later orienting the plot data to a map. Significant use intensity class changes between plots can also be noted and are useful for refining the finished map.

After all plots in the unit have been read and recorded, the information is transferred to a transparent allotment map overlay, each plot location being indicated by the appropriate use class symbol. The midpoints between differing use classes are then connected by an isogram line so that all use intensity class boundaries are delineated. The boundaries may be adjusted and refined as indicated by notes recorded at the time of sampling.

After boundaries have been firmed up on the overlay, they should be transferred to an allotment map along with an estimate of relative forage production. Coloring accentuates the graphic presentation.

USE PATTERN MAPPING WORKSHEET

FOREST _____ DISTRICT _____ EXAMINER _____

ALLOTMENT _____ UNIT _____

PLOT SPACING _____ ROW SPACING _____ DATE _____

Plot No.	1/Use Code	REMARKS 2/	Plot No.	1/Use Code	REMARKS 2/
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
0			0		
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
0			0		

1/Use Codes N - 0-10% (Negligible)	2/Include sufficient remarks to allow the use code to be oriented to a map.
L - 11-30% (Light)	Notes on between-plot situations are helpful.
M - 31-50% (Moderate)	
H - 51-70% (Heavy)	
V - 71% and over (Very Heavy)	

USE PATTERN MAPPING WORKSHEET
(Continuation Sheet)

Plot No.	Use Code	REMARKS	Plot No.	Use Code	REMARKS
1			6		
2			7		
3			8		
4			9		
5			0		
6			1		
7			2		
8			3		
9			4		
0			5		
1			6		
2			7		
3			8		
4			9		
5			0		
6			1		
7			2		
8			3		
9			4		
0			5		
1			6		
2			7		
3			8		
4			9		
5			0		

c. Region Three Method

Region Three has described in their Range Environmental Analysis Handbook - 1970 (FSH 2209.21) a method that is roughly intermediate to the two described here. Since the instructions for its use are several pages in length, they are not repeated in this Guide. A copy of the instructions can be made available upon request.

2. Interpretation

The map of use intensity distribution can be an extremely helpful tool in analyzing and identifying management problems. Some information can be learned by studying the map itself; much more can be learned by comparing it with the condition and suitability maps of the allotment. Comparing use patterns on the same unit over two or three years can be an education in itself on livestock behavioral patterns.

Analysis of the use pattern map can be an important aid in making management decisions by: (1) identifying weaknesses in distribution of use such as areas of unnecessarily light use and areas of excessive use; (2) identifying and locating areas previously classified as unsuitable that are being used under current management; (3) along with other information, helping to determine if stocking is too light, too heavy, or about right.

Techniques for interpreting the use pattern map can best be illustrated by example. Following is an example of interpretation using the information contained in Figures 1 and 2.

- a. A comparison of use distribution (Fig. 1) with suitability (Fig. 2) indicates that a sizable area of suitable range in the north and northwest part of the unit received only negligible to light use. The same situation occurs, to a lesser extent, in the eastern part of the unit. This evidence suggests a needed management action to draw additional use to these areas. The implication is a modification in herding and salting practices and/or installation of additional watering facilities in these areas. Perhaps other management modifications would also yield desired results.
- b. A comparison of Figure 1 with Figure 2 also reveals that an area classified as unsuitable in the south part of the unit is receiving heavy use under present management, probably because of the presence of a stock watering pond. Here, too, a management decision must be made. Is the site truly unsuitable or can the heavy use it is receiving be accepted? If the site is actually unsuitable, then the evidence indicates a management action to relieve use on the site. Perhaps the pond should be drained and watering facilities provided elsewhere.

- c. A small area of unsuitable range near the center of the unit is also receiving light use. This evidence serves as a "red flag." It would not necessarily call for immediate management action but does alert the manager that this area must be watched carefully. If additional study reveals that the site cannot stand even the light use it is receiving, then management action would have to be taken to correct the problem.



Figure 1.

Use Pattern Map of the Unit

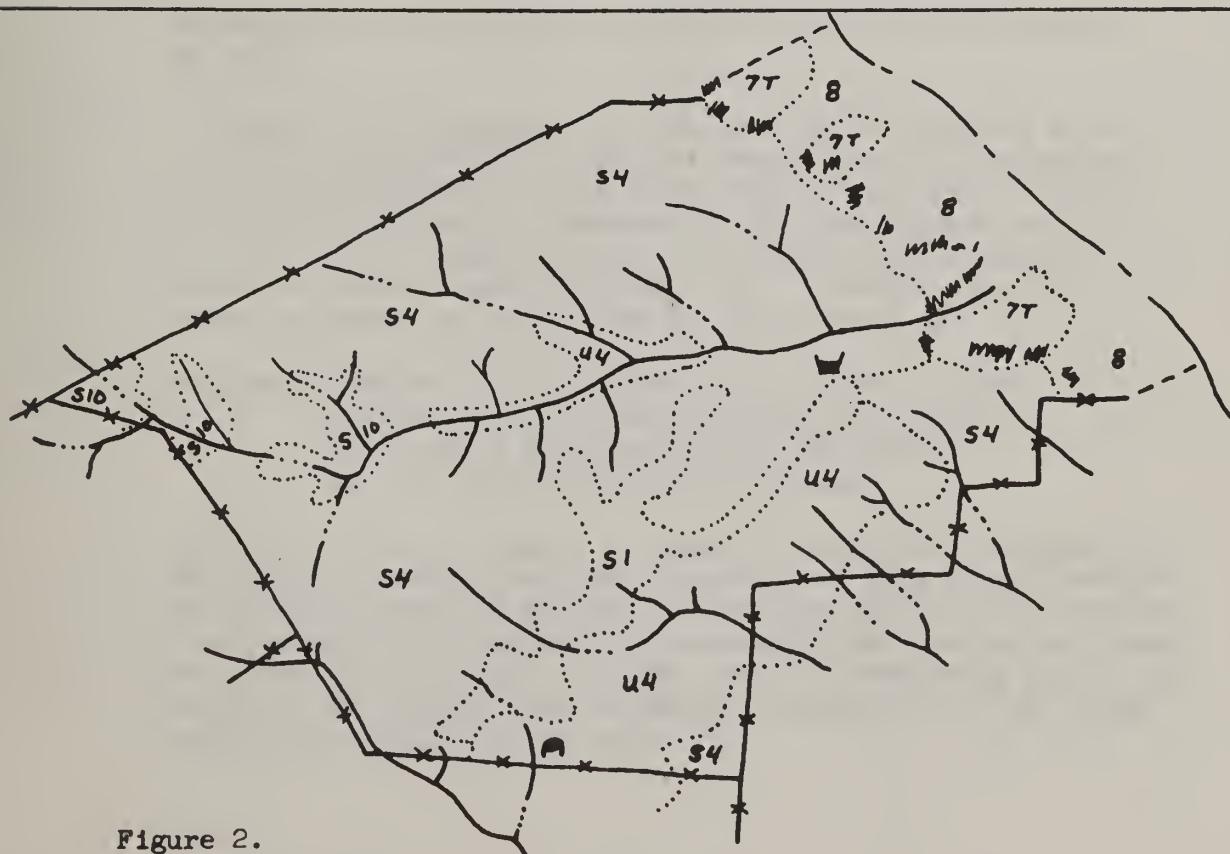


Figure 2.

Suitability Map of the Unit

7.33 Firming Up Stocking Rate

The initial stocking rate under a newly implemented management program is a test rate based on predictions of forage yield, animal behavior, etc. Such predictions must be confirmed or adjusted by actual results.

Actual use may demonstrate that the initial stocking rate is somewhat higher or lower than desired. This is judged by comparing actual results with those constraints imposed by various critical situations. Such situations usually derive from site characteristics, coordination needs, livestock responses, or circumstances untenable to permittee or administrator.

The relationship of actual results to those desired should be quantified so that needed changes in stocking rate can be determined. Conclusions as to proper stocking rates can be reached through use of professional judgment or by the use of mathematical calculations or both. Stocking should then be adjusted in the direction and amount indicated and re-tested under actual use. A suggested procedure for making this adjustment follows:

Evaluate the impacts of actual use in terms of site limitations and coordination requirements on a site-by-site basis. Relate these impacts to those that are considered acceptable and achievable. The differences, on a unit basis, represent the spread between initial and proper levels of use for that year. Following this scheme for one rotation cycle will provide sound data for firming up the stocking rate.

1. Determine the acreage for each use intensity classification by units.
2. Calculate forage consumed in each unit by multiplying acres in each classification times the forage yield in pounds/acre for that classification times the midpoint percent of the use-intensity class it represents. The sum of such calculations for each classification in the unit represents the forage actually consumed in that unit. For convenience, pounds consumed may be rounded to the nearest ton.

Example: A moderately used area of 125 acres has an average yield of 900 lbs./acre dry weight.
 $125 \text{ acres} \times 900 \text{ lbs.} \times 40\% = 45,000 \text{ lbs.}$
 or 22.5 tons dry weight consumed.

3. Calculate forage available per unit by repeating the previous calculations except that use intensity for each classification is adjusted upward or downward to the desired level. Overused classifications are reduced to acceptable use levels and under-used ones are increased to levels you can reasonably expect to achieve. The sum of these calculations represents the forage actually available on the unit.

7.4

4. Determine actual use in animal months by units based on numbers of animals and time spent in the unit.
5. Forage tonnage data may be converted to animal months by solving the following equation:

$$\text{Available Use in AM} = \frac{\text{Actual Use in AM} \times \text{tons of forage available}}{\text{Tons of forage actually consumed}}$$

The resulting figure is based on current year data and must be adjusted to an annual average.

6. Convert current year's forage yield data to an annual average for selected sites from which yield data for two or more previous years is available. The proportion that current year's yield is to the average is then applied to the current estimate of "available use in AM." The result represents an annual average and can be used as a basis for adjusting stocking rates.
7. The relationship of yield data from low range to high may differ. If so, it is necessary to estimate the proportion of use represented by each and make the adjustment accordingly.
8. The sum of the adjusted estimates for the combination of lowest capacity units to be used in any one year will equal the new estimate of stocking rate to be tested.

7.4 STUDY SITES AND TREND STUDIES

Study sites are permanent reference points. They are physical locations on the ground and are selected because of their sensitivity to some impact of grazing management. Every study site will be a source location for gathering information related to condition trend and its interpretation. As such they are the locations for studies that provide such data. They should encompass a uniform situation and may be thought of as macroplots from which specific information will be gathered.

Detailed and definitive knowledge from these specific sites is needed as a base from which to properly evaluate the overall picture. This provides a long-term check on stocking rate and management effectiveness. It also provides good focal points for determining apparent trend.

7.41 Selection of Study Sites

On many allotments some study sites (bench marks) are already established on the basis of prior management. They were used in evaluating the old management scheme and in developing the new one. However, when an allotment is divided into pasture units, or when the management is significantly altered, it is necessary to take a new look at the locations. Such changes alter or modify the distribution of the grazing use.

When there are significant changes in management or significant development work is planned, selection of study sites and design and installation of the trend study system should be deferred until the new program is implemented and actual use can be observed under the changed conditions.

Use should be made of existing study sites (bench marks) wherever they will contribute to the new management system. Some may need to be shifted to new locations because of changes in distribution of use, and many new situations may become important for study. In fact, an entirely new look should be taken. Shortage of funds and/or manpower should not influence selection of study sites. Choose as many as are needed to properly evaluate the allotment. Then, if necessary, let available funds and manpower limit the intensity of study applied to each.

Following are some examples of situations that might be important for study under the planned-rest model.

1. Sensitive slopes onto which the changed management may force additional use.
2. Sites that are particularly important for big game forage.
3. Areas of sage grouse habitat.
4. Livestock concentration areas.
5. Timber cutting areas where correlation of forage use and timber regeneration is important.

7.42 Permanent Trend Studies

Permanent trend studies of one kind or another should be installed on all study sites. Studies used on a specific site may vary from permanent camera points and recorded observations of impacts to the more complex quantitative techniques and grazing impact analysis transects. Availability of time and importance of the study site will help you decide on the specific studies to install. The type of study chosen for a particular site should yield the kind of information needed for that site. Fullest possible use should be made of existing trend studies. If continued, they should be remeasured immediately after program implementation to establish a new set of base data.

Trend studies should be programmed for periodic future remeasurement and evaluation. Usually, installation and remeasurement should be timed to coincide with a rest period in the rotation cycle. Higher quality data can usually be obtained if the site is free from trampling and plant utilization.

7.43 Supplemental Information

The trend study itself serves only to measure changes that have occurred over time. Useful interpretation of the meaning of such changes requires the availability of supplemental information.

1. Site Characteristics.

Basic information about the site itself is helpful in understanding the changes and in distinguishing between normal and induced changes. Characteristics such as slope, cover type, elevation, parent material, soil depth and productivity, and others, all affect the normal dynamics of the plant community. The Study Site Characteristics worksheet provides a means of briefing such information. This record should be filled in as accurately and completely as possible for all study sites. It should be filed with the study record.

2. Other Influences.

It is as important to know why a measured change occurs as it is to know of the change itself. The cause of change must be determined if meaningful management decisions are to be made. This requires a continuing record of impacts on the study site during the interval between trend study measurements.

Although livestock grazing may often be an important impact on the site, it is only one of many influences that may induce changes to occur. The relationship of other factors such as game use, climatic fluctuations, and the effects of rodents, insects, disease, fire, floods, etc., must be known and evaluated or misinterpretation of trend may result. The Study Site Impact Record worksheet should be used to accumulate a record of these influences. This can be done during allotment examination with little additional time impact if it is anticipated during preplanning of field tasks. The information entered should be specific to the study site since it will be correlated with the trend study located thereon. However, findings can also be extrapolated to help guide management of the unit as a whole.

7.5 SPECIAL STUDIES

There is a periodic and continuing need for specific types of information not yielded by usual or standard study methods. As need for such information becomes apparent, it is appropriate to consider studies specifically designed to yield the desired information. Such studies are often the source of new knowledge that would not otherwise become available. In this way they contribute directly to improvement in techniques and management.

It is impractical to attempt a description of special studies since they must be "tailor made" to fit a given situation and to yield specific data. Sometimes, the special study may be formalized as an administrative study but usually this is neither necessary nor desirable. Sometimes, too, the special study may be quite complex but, ordinarily, should be kept as simple as possible. A common error in special study design is the tendency toward unworkable complexity. This usually results in the findings being clouded by variables so that no firm conclusions can be reached. Advice from Regional Office and/or Research personnel should be an accepted prerequisite to special study design.

CHAPTER 8

MANAGING SHEEP ALLOTMENTS

The material presented in the early chapters of this Guide is oriented primarily toward cattle management. Generally, the conceptual approach and the procedures apply equally well to sheep management but some differences should be recognized. This chapter describes some of the features of sheep management and handling that must be kept in mind during planning and evaluation followup.

8.1 SHEEP GRAZING SITUATIONS

Sheep allotments can be categorized as presenting one of three different general situations. The differences must be recognized and given full consideration in planning the management program.

1. Allotments with blocked suitability patterns.

This is the most common situation encountered. The bulk of each allotment is suitable for grazing. Management control is exercised by dividing the allotment into several defined units. In this situation, it is more practical to predict potential capacity and record actual use in terms of band days than sheep days.

Good sheep husbandry is not normally compatible with a heavy degree of use. Sheep should be allowed to seek their own level of forage utilization. They prefer different plants and different areas at various times of the year and this should be considered in designing the management prescription.

2. Allotments with stringer or patchy suitability patterns.

Some allotments contain large amounts of nonrange or unsuitable types. Forage production is limited to stringers, pockets, basins, etc. In this situation, the key to sheep grazing is the design of planned routes of travel for the band. Original suitability classifications must be adjusted and firmed up to reflect the opportunities for moving the band about over the allotment. Grazing capacity is estimated from the actual time required for the band to traverse the various routes of travel. The band must either make the trip or not make it. Grazing capacity estimates at some level in between are meaningless. Evaluation followup must be especially attentive to the acceptability of grazing impacts along the routes. If actual impacts are acceptable, then grazing capacity equals the band days required to traverse the route. If impacts at any point along the way are unacceptable and cannot be circumvented, then the grazing capacity becomes zero because the route cannot be used. Management program design must fully consider these points.

3. Allotments under herderless management.

Because we have very limited experience with this form of management, no attempt is made to define specific requirements. It would appear that material in this Guide could apply rather directly, but each case should be studied on its own.

8.2 SHEEP GRAZING HABITS

1. Sheep are finicky feeders in the morning and choose only a tidbit of the choicest plants.
2. Sheep will settle down and feed better in the evening and are not nearly as selective in their choice of forage at that time.
3. The less the herder handles the herd the better the animals thrive.
4. Sheep prefer fresh feed each day. In order to systematically graze an allotment, checks and controls must be applied by the herder.
5. Open herding results in less travel by the sheep. Grazing in compact herds results in more travel with its accompanying trampling damage and waste of forage.
6. Sheep have a tendency to become nervous if separated from the main herd--even small bunches do not act normally if they remain in an area after the herd passes on.
7. Thick brush acts as a barrier to grazing sheep even though there are some travel ways through it.
8. To produce fat lambs, the herd should have an abundant supply of fresh, succulent feed (also water) and as much freedom as possible.

8.3 FACTORS AFFECTING SHEEP MOVEMENT AND HERDING

1. Topography.
 - a. Moderate topography is best for ease of handling.
 - b. When sheep leave the shadeup place during warm weather, they will tend to graze on the shadier side of the canyon and avoid the open slopes until towards evening.
 - c. Steep abrupt slopes are barriers to a grazing herd. Even moderate slopes will divert the grazing animals.
 - d. Where the topography is near level or gently rolling, the sheep have a tendency to travel more--however, when a herd reaches the upper basins of their allotment, they become more satisfied and will settle down.

2. Vegetation types.

- a. It is very difficult to force sheep to shift from good lush forage to that of lower quality--shifting from forbs to mature grass is an example.
- b. Once-over use until the lambs are removed is desirable for maximum lamb production.
- c. Sheep make good use of aspen range in warm weather. They like to graze in the shade of the aspen in the afternoons after leaving the shadeup area.
- d. Thick brush acts as a strong barrier to a grazing herd. Heavy stands of sagebrush, chokecherry or other brush may be entirely unsuitable.

3. Degree of utilization.

- a. Sheep prefer fresh feed each day.
- b. Elapsed time will allow the feed to freshen up, particularly if there is a rain.
- c. Holding sheep on an area too long (not necessarily excessive grazing) will result in restlessness of the sheep.
- d. If use is forced, it will require the herder to tighten up the spread of the herd with resulting trampling damage to the range and adverse effects on the sheep.

4. Weather conditions.

- a. During cool or stormy weather the sheep have a tendency to travel. During cold wet storms the animals keep on the move to keep warm.
- b. During warm summer days sheep lie around a great deal. They will spend from 9:00 a.m. to 4:00 or 5:00 p.m. lying in the shade. During these times, the sheep begin grazing at daylight and from 4 or 5 o'clock in the evening until dark.

5. Water distribution.

- a. Ideal situation - stream or spring in bottom of every canyon.
- b. It is an advantage to management (and suitability) to pipe water from hillsides to the canyon bottom. It is very difficult to force sheep to use the slopes below the spring or water development. Sheep will not graze downhill in the evenings.
- c. Watering sites should be close enough that excess trailing is not necessary.
- d. Doubling the distance sheep have to travel to water increases the grazing area adjacent to water source four times.
- e. They should not be required to go more than a mile to water.

6. Aspect.

- a. In the Minidoka area sheep preferred north and east slopes to south and west during the summer period. The hot sun beating down on the south and west slopes is responsible for the choice. Afternoons are much warmer than mornings.
- b. Feed is generally more succulent on the cooler aspects (N & E).
- c. Sheep grazing the exposed slopes (S & W) leave the shade late and as a consequence the evening grazing period is cut short.
- d. On west slopes the shorter evening feeding period is compensated to a degree by the longer feeding period in the morning.

7. Degree of Slope.

- a. Sheep will not start grazing up a steep hillside if there is an alternate route. Sometimes only strong force will get the sheep to pull onto the slopes (60 percent or above).
- b. Sheep travel much slower on steep slopes than on more gentle topography.
- c. It is difficult to get sheep off from steep slopes once they are established. The herd will delay going to water until they are very thirsty. They will then trail (often on a run) off the slope with resulting damage to the range and slopes.

8. Parts of range normally overgrazed.

- a. Because both the herder and the sheep follow the path of least resistance, the most accessible and easily herded parts of the range will be grazed most heavily.
- b. Areas adjacent to water - the farther the watering places are apart, the greater the pressure.
- c. Shadeup places where shade is not plentiful. Shading up too often in one place is as bad as repetitive use of bedgrounds.
- d. Sheep prefer the upper half of slopes and ridgetops.

9. Parts underutilized.

- a. Small isolated corners.
- b. Slopes cut up or isolated by rocks or brush.
- c. Lower part of long slopes.
- d. Slopes below available water.
- e. Steep, rough country.

